

INPUT SHOCKS WITH PUBLIC-PRIVATE SECTOR: REVISITING RYBCZYNSKI'S THEOREM

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ABSTRACT

This paper uses Rybczynski's theorem to simulate the effect of labor shocks on total and sectoral output. It provides a graphical and numerical simulation of Rybczynski effects of labor movements on the various variables of the economy. The special case includes modeling a scenario of a shock in the labor supply (decrease in labor supply). We consider an economy that has two sectors (a public sector and a private sector). As the inputs, namely capital and labor, move from the public sector to the private sector the output of goods that use intensively the factor of production increases. This study uses the Lagrangian technique, to solve for output maximization under the usual technological constraint, and comparative statics to derive Rybczynski effects. Results of the mathematical model are used to simulate and test some of the comparative statics of our model. We find that a decline in capital (labor) endowment will increase (decrease) output in the labor (capital) intensive sector and decrease the overall level of economic activity. A sharp decline in labor (due to technological advancements, war, or social unrest) will decline overall economic activity.

Keywords: Rybczynski effect, factor endowment, Lagrangian, input factors intensities

1. INTRODUCTION

The public sector in countries around the world has been an essential part of production and consumption. It averages out at about 20 % in 1972 to 27 % in 2020 (World Bank Data, 2021), an increase of about seven percentage points in the last five decades. The private sector and public sector share their inputs based on the technologies they employ in the production of goods and services and capital goods among other inputs. Labor shocks, that is an increase or decrease in labor supply, are part of events accompanying the economics of both public and private sectors. These labor shocks affect the amount of total output and the amount of output produced in each sector. The sectorial output changes display differences in magnitude. These differences are driven by the intensity of labor used in each sector. Policymakers, businesses, and researchers would be interested to measure these labor shocks' effect on total output and the labor shocks' effect on the public sector and private sector.

The Rybczynski theorem (Rybczynski, 1955) is a very adequate tool to study comparative statics of input factor movements within one country or in an international trade scenario. It shows the effect of a change on the endowment of a factor (labor or capital) to total output and the output of goods that uses different factor intensities in their production (Ma, 2009). It simply states that an increase in one of the inputs of production will lead to an increase in the output that intensively uses that input, conditioned upon constant prices of goods and constant prices of inputs.

This work was extended by Jones (1965) who explored the possibility of various degrees of changes (different rates) in the factors of production. Jones's contribution is so crucial in extending Rybczynski's theorem that it is so often that the literature refers to it as the Rybczynski-Jones theorem (R-J, thereafter). Rybczynski's work adds new nuances to well-established Heckscher-Ohlin (H-O) and to the Stolper-Samuelson (Stolper and Samuelson, 1941), (S-S) theorems in international trade. Rybczynski theorem has been used for both theoretical (Jehle, 1989; Opp, et al., 2009) and empirical explorations (Hanson & Slaughter, 1999; Gandall, et al., 2004). Öztürk (2020), for example, summarizes Rybczynski's Theorem and scarce literature on empirical findings about labor mobility's impact on the economy, hence the Rybczynski effect. New evidence on the Rybczynski effect includes studies on the sectorial output mix of